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(12) **United States Patent**
Israelachvili

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(54) **EXTENDED-RANGE XYZ LINEAR
PIEZO-MECHANICAL SCANNER FOR
SCANNING-PROBE AND SURFACE FORCE
APPLICATIONS**

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(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(57) **ABSTRACT**

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A piezo-mechanical scanner that provides independent and linear displacements in three orthogonal directions with high sensitivity in the normal z direction and high range in the lateral x and y directions. The independence of the directional displacements is ensured by physically dividing into four distinct sectors the piezoelectric tube chiefly responsible for the generation of the movements. Linearity of the movement is maintained by providing mechanical enhancement of the movements in the x-y plane.

(51) **Int. Cl.⁷ H01L 41/08**

(52) **U.S. Cl. 310/328; 310/369**

(58) **Field of Search 310/328, 369**

(56) **References Cited**

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7 Claims, 4 Drawing Sheets

